METHOD FOR OPTIMIZING WRITE CURRENT IN MAGNETIC MEMORY, AND MAGNETIC MEMORY

ABSTRACT

The invention provides methods and apparatus for for determining and providing optimum write bit line current and write word line current in an MRAM. A single reference potential is used to determine the values of the write line current and the bit line current. In determining the optimal values, asteroid curves representing bit line magnetic fields H_x generated by write bit line current I_B and word line magnetic fields H_y generated by write word line current I_w for magnetization are considered, and an asteroid curve AC_{out} is defined outside the asteroid curves of all memory cells taking manufacture variations and design margins into account. A write bit line current and a write word line current are selected such that the write current obtained by adding the write bit line current or currents and the write word line current, or the write power consumed by the bit line or lines and the write word line is minimized. Furthermore, in order to prevent multi-selection, the write bit line current and the write word line current are selected so that they generate a synthetic magnetic field on the curve between calculated points of the asteroid curve AC_{out}.